IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant:	An *et al.*
Title:	METHOD AND SYSTEM FOR ASSESSING LOAN CREDIT RISK AND PERFORMANCE
Appl. No.:	10/816,496
Filing Date:	4/1/2004
Examiner:	Trotter, Scott S.
Art Unit:	3694
Confirmation Number:	8612

BRIEF ON APPEAL

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Sir:

Under the provisions of 37 C.F.R. § 41.37, this Appeal Brief is being filed together with a credit card payment form in the amount of $540.00 covering the 37 C.F.R. 41.20(b)(2) appeal fee. If this fee is deemed to be insufficient, authorization is hereby given to charge any deficiency (or credit any balance) to the undersigned deposit account 19-0741.

REAL PARTY IN INTEREST

The real party of interest is Fannie Mae, having a place of business at 3900 Wisconsin Avenue, NW, Washington, D.C. 20016-2892. This Application names Mark Y. An, Cristian A. De Ritis, and Eric L. Rosenblatt as inventors.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences that will directly affect, be directly affected by, or have a bearing on the present appeal, that are known to Appellant or Appellant's patent representative.

STATUS OF CLAIMS

On July 14, 2008 and pursuant to a Restriction Requirement issued June 13, 2008, claims 11-16, 20-23, and 24-27 were elected for examination, and claims 1-10, 17-19, and 28-32 were withdrawn from consideration.

Claims 1-10, 17-19, and 24-32 were cancelled in Appellant's Amendment and Reply dated February 17, 2009.

Claims 11-16 and 20-23 were pending in the present application when a Final Office Action dated November 24, 2009, was issued.

Claims 11, 16, 20, and 22 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 7,165,043 (Keyes *et al.*)

Claims 12-15 and 21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 7,165,043 (Keyes *et al.*) in view of U.S. Patent No. 7,188,084 (Starkman).

The above rejections were maintained in a Notice of Panel Decision from Pre-Appeal Brief Review dated June 9, 2010.

Claims 11-16 and 20-23 are pending in the present application. The Examiner's rejection of claims 11-16 and 20-23 is being appealed.

Claims 11, 16, 20, and 22 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 7,165,043 (Keyes *et al.*)

Claims 12-15 and 21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 7,165,043 (Keyes *et al.*) in view of U.S. Patent No. 7,188,084 (Starkman).

Claim 23 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 7,165,043 (Keyes *et al.*) in view of admitted prior art.

STATUS OF AMENDMENTS

No amendment was filed after the November 24, 2009, mailing date of the Final Office Action.

SUMMARY OF CLAIMED SUBJECT MATTER

In accordance with one embodiment, as described in independent claim 11 of the present application, a machine readable media having stored therein a set of instructions that when executed cause a computer to implement a process for determining a probability of an adverse event in connection with a plurality of loans, the plurality of loans having varying amounts of loan data available, is disclosed. (*See, e.g.,* page 5, lines 4-7 and 20-22; page 7, line 13-page 8, line 2; page 36, line 14-page 37, line 28; and Figures 1 and 6.) The process comprises

constructing a first mathematical model for use with loans for which loan data is available for a set of explanatory variables, the set of explanatory variables including variables that relate to risk characteristics of the loan, risk characteristics of collateral for the loan, and risk characteristics of a borrower associated with the loan. (*See, e.g.*, page 5, line 22-page 6, line 2; page 7, lines 14-25; page 8, line 3-page 15, line 15; and Figure 1.) The process further comprises constructing a second mathematical model for use with loans for which at least some of the loan data for the set of explanatory variables is not available. (*See, e.g.*, page 5, lines 12-27; page 7, line 25-page 8, line 6; page 9, line 13-page 16, line 5; and Figure 1.) The constructing of the second mathematical model includes estimating the probability of the adverse event for a first group of loans for which the loan data is available for the set of explanatory variables using the first mathematical model. (*See, e.g.*, page 21, line 24-page 22, line 2; and Figure 3.) The constructing of the second mathematical model also includes iteratively estimating the probability of the adverse event for the first group of loans using the second mathematical model. (*See, e.g.*, page 16, line 22-page 18, line 2; page 21, line 24-page 22, line 2; and Figure 3.) Furthermore, the constructing of the second mathematical model includes selecting an optimal set of weighting coefficients for the second mathematical model, the optimal set of coefficients being selected so as to minimize errors in outputs generated by the second mathematical model for the first group of loans relative to outputs generated by the first mathematical model for the first group of loans. (*See, e.g.*, page 5, line 12-page 6, line 13; page 14, line 22-page 19, line 11; and Figure 2.) Further still, the constructing of the second mathematical model includes storing a set of error values, the set of error values relating to the errors in the outputs generated by the second

mathematical when using the optimal set of coefficients relative to the outputs generated by the first mathematical model. (*See, e.g.,* page 17, line 6-page 19, line 5; and Figure 2.) Moreover, the process further comprises estimating the probability of the adverse event for a second group of loans using the second mathematical model, wherein at least some loan data for the set of explanatory variables is not available for the second group of loans, and wherein estimating the probability of the adverse event for the second group of loans includes randomly drawing error values from the set of error values and adjusting the outputs of the second mathematical model for the second group of loans in accordance with the randomly drawn error values, the randomly drawn error values causing a distribution of the probability values produced by the second mathematical model for the second group of loans to more closely match a distribution of the probability values produced by the first mathematical model for the first group of loans. (*See, e.g.,* page 20, line 6-page 22, line 17; and Figure 2.)

In accordance with another embodiment, as described in independent claim 20 of the present application, a machine readable media having stored therein a set of instructions that when executed cause a computer to implement a process is disclosed. (*See, e.g.,* page 36, line 14-page 37, line 28; and Figures 1 and 6.) The process comprises estimating a first set of weighting coefficients for a first mathematical model by performing a first regression operation, the first mathematical model being a function of a predetermined set of loan parameters and the first set of weighting coefficients, the first set of weighting coefficients being associated with respective ones of the predetermined set of loan parameters, the first regression operation optimizing the first set of weighting coefficients based on performance history of a first plurality

of loans, the first plurality of loans having loan data available for the predetermined set of loan parameters. (*See, e.g.*, page 5, line 20-page 6, line 2; page 7, lines 14-25; page 8, lines 7-8; page 8, line 12-page 16, line 21; and Figures 1 and 2.) The process also comprises estimating a second set of weighting coefficients for a second mathematical model by performing a second regression operation, the second model being a function of only a subset of the predetermined loan parameters and the second set of weighting coefficients, the second set of weighting coefficients being associated with respective ones of the subset of the predetermined set of loan parameters, the second regression operation causing the second mathematical model to produce a probability distribution which is in overall alignment with a probability distribution produced by the first mathematical, the second mathematical model further being a function of a set of stored error values relating to errors in probabilities produced by the second mathematical model as compared to probabilities produced by the first mathematical model. (*See, e.g.*, page 5, line 20-page 6, line 13; page 7, line 25-page 8, line 2; page 8, lines 8-9; page 8, line 12-page 19, line 5; and Figures 1 and 2.) Additionally still, the process comprises determining the probability of the adverse event using the second mathematical model in connection with a second plurality of loans, including randomly drawing error values from the set of error values and adjusting the outputs of the second mathematical model for the second plurality of loans in accordance with the randomly drawn error values, the randomly drawn error values causing a distribution of the probability values produced by the second mathematical model for the second plurality of loans to more closely match a distribution of the probability values produced by the first mathematical

model for the first group of loans. (*See, e.g.,* page 6, lines 12-13; page 19, line 6-page 22, line 17; and Figures 2 and 3.)

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The first ground of rejection to be reviewed on appeal is the Examiner's rejection of claims 11, 16, 20, and 22 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 7,165,043 (Keyes *et al.*)

The second ground of rejection to be reviewed on appeal is the Examiner's rejection of claims 12-15 and 21 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 7,165,043 (Keyes *et al.*) in view of U.S. Patent No. 7,188,084 (Starkman).

The third ground of rejection to be reviewed on appeal is the Examiner's rejection of claim 23 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 7,165,043 (Keyes *et al.*) in view of admitted prior art.

ARGUMENT

Discussion of Rejections under 35 U.S.C. § 102(a):

Requirements for a *prima facie* case of anticipation

It is well established that, in order to establish a *prima facie* case of anticipation under 35 U.S.C. § 102, the Office Action must cite a single reference disclosing each and every element of the claimed invention. For example, the Court of Appeals for the Federal Circuit has held that "[u]nder 35 U.S.C. § 102, anticipation requires that each and every element of the claimed invention be disclosed in a prior art reference ...." *Akzo N.V. v. U.S. Int'l Trade Comm'n*, 808 F.2d 1471 (Fed.Cir. 1987). See also, *In re Paulsen*, 30 F.3d 1475 (Fed.Cir. 1994)

("A rejection for anticipation under section 102 requires that each and every limitation of the claimed invention be disclosed in a single prior art reference.")

Further, "every element and limitation of the claimed invention must be found in a single prior art reference, arranged as in the claim." *Brown v. 3M*, 265 F.3d 1349 (Fed.Cir. 2001), citing *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376 (Fed.Cir. 2001); *Scripps Clinic & Research Foundation v. Genentech, Inc.*, 927 F.2d 1565 (Fed.Cir. 1991).

Representative claim

Claim 11 recites:

> 11. Machine readable media having stored therein a set of instructions that when executed cause a computer to implement a process for determining a probability of an adverse event in connection with a plurality of loans, the plurality of loans having varying amounts of loan data available, the process comprising:
>
> [A] **constructing a first mathematical model for use with loans for which loan data is available for a set of explanatory variables, the set of explanatory variables including variables that relate to risk characteristics of the loan, risk characteristics of collateral for the loan,** and risk characteristics of a borrower associated with the loan;
>
> [B] **constructing a second mathematical model for use with loans for which at least some of the loan data for the set of explanatory variables is not available,** including
>
> [i] **estimating the probability of the adverse event for a first group of loans** for which the loan data is available for the set of explanatory variables **using the first mathematical model,**
>
> [ii] **iteratively estimating the probability of the adverse event for the first group of loans using the second mathematical model,**

[iii] **selecting an optimal set of weighting coefficients for the second mathematical model, the optimal set of coefficients being selected so as to minimize errors in outputs generated by the second mathematical model for the first group of loans relative to outputs generated by the first mathematical model** for the first group of loans, and

[iv] **storing a set of error values,** the set of error values relating to the errors in the outputs generated by the second mathematical when using the optimal set of coefficients **relative to the outputs generated by the first mathematical model**; and

[C] **estimating the probability of the adverse event for a second group of loans** using the second mathematical model, wherein at least some loan data for the set of explanatory variables is not available for the second group of loans, and wherein estimating the probability of the adverse event for the second group of loans includes **randomly drawing error values from the set of error values and adjusting the outputs of the second mathematical model for the second group of loans in accordance with the randomly drawn error values, the randomly drawn error values causing a distribution of the probability values produced by the second mathematical model for the second group of loans to more closely match a distribution of the probability values produced by the first mathematical model for the first group of loans.**

(Appellant notes that, for sake of facilitating the present discussion only, each of the steps has been designated [A], [B][i]-[B][iv], and [C], respectively.)[1]

I. Keyes *et al.* fails to disclose all the claim limitations and fails to anticipate the claims because Keyes *et al.* fails to teach or suggest "constructing *a first mathematical model* for use with loans for which loan data *is available* for a set of explanatory variables" and

[1] It should be noted that Appellant's previously filed remarks/arguments were, and are now again primarily focused on the rejections of the independent claims of the present application (*i.e.*, 11 and 20) with the understanding that the dependent claims that depend from the independent claims are patentable for at least the same reasons (and other reasons) that the independent claims are patentable. Appellant continues to reserve the right to argue the patentability of the dependent claims separately in any future proceedings.

"constructing *a second mathematical model* for use with loans for which at least some of the loan data for the set of explanatory variables *is not available*."

First, Appellant submits that Keyes *et al.* fails to teach or suggest "constructing *a first mathematical model* for use with loans for which loan data *is available* for a set of explanatory variables" and "constructing *a second mathematical model* for use with loans for which at least some of the loan data for the set of explanatory variables *is not available*." Hence, in the arrangement set forth in independent claim 11, first and second mathematical models are constructed. The second mathematical model is for use with loans for which at least some of the loan data for a set of explanatory variables is not available. As set forth in sub-steps [B][i]-[B][iv], the second mathematical model is constructed using outputs of the first mathematical model. (*See*, paragraphs [0006]-[0011] of the present application (describing shortcomings in the prior art, and that it would be desirable to, *e.g.*, evaluate/characterize the performance of a group of loans relative to the performance of another group of loans with differing explanatory variables – hence the need for the first and second mathematical models and the claimed method of their construction, as well as their function/use in determining the probability of an adverse event, as discussed in greater detail below)).

In connection with these features, the Examiner relies on Column 1, line 53-Column 2, line 21 of Keyes *et al.*, which recites the following:

> In an exemplary embodiment, an iterative and adaptive approach is provided wherein a portfolio is divided into three major valuations. Full underwriting of a first type of valuation of an asset portfolio is performed based upon an adverse sample. A second valuation type is efficiently sampled from categories of common descriptive attributes, and the assets in the selective random sample are fully underwritten. The third valuation type is subjected to statistically

> inferred valuation using underwriting values and variances of the first and second portions and applying statistical inference to individually value each asset in the third portion. Clustering and data reduction are used in valuing the third portion.
>
> As the process proceeds and more assets are underwritten, the number of assets in the first and second portions increase and the number of assets in the third portion decreases and the variance of the valuation of the assets in the third portion becomes more and more defined. More specifically, the assets in the third portion are evaluated by grouping the assets into clusters based on similarity to valuations of assets in the first and second portions.
>
> A method for predicting value of non-underwritten assets for which data representations are partial or incomplete by projecting values onto the non-underwritten assets from at least one of fully underwritten assets, other non-underwritten assets with complete data representations and available data from non-underwritten assets with partial or incomplete data representations having similar identifiable characteristics is disclosed. The method includes the steps of sampling assets according to risk, underwriting assets and recording valuations, forming market value clusters, building regression models for underwritten assets, selecting the best models for the underwritten assets, counting a number of times the models are selected and using the selected model to make a prediction of underwriting value for the non-underwritten assets.

This passage of Keyes contains passing reference to "regression models." Notably, however, no mention is made of first and second mathematical models, wherein the first is used with loans for which loan data *is available* for a set of explanatory variables and the second mathematical model for use with loans for which at least some of the loan data for the set of explanatory variables *is not available,* as claimed. Despite repeated prompting from Appellant, the Examiner has never specified how the discussion at Column 1, line 53-Column 2, line 21 corresponds to the claim language.

The Examiner also relies on the Abstract and Column 1, line 53-Column 2, line 21 as alleged support for the assertion that both first and second mathematical models are taught. The Abstract of Keyes *et al.* indicates the following:

> A method of valuation of large groups of assets by partial full underwriting, **partial sample underwriting** and **inferred values** of the remainder using an iterative and adaptive supervised and unsupervised statistical evaluation of all assets and statistical inferences drawn from the evaluation and applied to generate the inferred values. Individual asset values are developed and listed in tables so that individual asset values can be rapidly taken from the tables and quickly grouped in any desired or prescribed manner for bidding purposes. The assets are collected into a database, divided into categories by credit variable, subdivided by ratings as to those variables and then rated individually. The assets are then regrouped according to a bidding grouping and a collective valuations established by cumulating the individual valuations.

Appellant submits that nothing in the Abstract of Keyes *et al.* teaches or suggests the construction of a first mathematical model or a second mathematical model as claimed by independent claim 11 of the present application.

In the Final Office Action of November 24, 2009, the Examiner further asserted the following in response to Appellant's arguments:

> As for the first and second mathematical model Keyes uses different models to arrive at the values depending on the amount of information available. (*See at least Keyes abstract.* Partial sample underwriting (one model) and inferred values of the remainder (second model).) Also whether a system has one complicated mathematical model or two or more mathematical models which are combined is completely subjective.

Specifically with regard to partial sample underwriting and inferred remainder values, Keyes *et al.* at Column 5, lines 12-27, describes merely randomly sampling groups of assets within some cluster (partial sample underwriting) as opposed to "full sample

underwriting" which involves 100% sampling of the sample groups in asset categories. Keyes *et al.* at the Abstract, clearly indicates that the inferred values "are generated," and thus are merely resulting values, not any sort of mathematical model that can be used/constructed relative to a first mathematical model for determining the probability of an adverse event as explicitly recited in independent claim 11.

In light of the above, Appellant submits that at best, Keyes *et al.* only teaches the construction of a first mathematical model. Those non-underwritten assets for which data representations are partial or incomplete have no such "second mathematical model" constructed for estimating the probability of adverse events therewith. These sections of Keyes *et al.* fail to contain any actual mention of such first and second mathematical models constructed in the manner disclosed in independent claim 11. Despite Appellant's repeated requests for an identification/explanation of how a "partial sample underwriting" and "inferred values of the remainder" allegedly read on the claimed first and second mathematical models constructed in the manner disclosed in claim 11 and/or rebut Applicant's above interpretation of Keyes *et al.*, no such response has been presented by the Examiner.

Appellant submits that the Examiner has not addressed Appellant's arguments with respect to the "constructing *a first mathematical model* for use with loans for which loan data *is available* for a set of explanatory variables" and "constructing *a second mathematical model* for use with loans for which at least some of the loan data for the set of explanatory variables *is not available*" limitations. As such, Appellant submits that the Examiner has failed to satisfy the requirements set forth under Section 707.07(f) of the MPEP, which states that

"[w]here the applicant traverses any rejection, the examiner should, if he or she repeats the rejection, take note of the applicant's argument and <u>answer the substance of it</u>." (Emphasis added). In this instance, although the Examiner maintained and repeated the rejection of claims 11, 16, 20, and 22 under 35 U.S.C. §102(b) from the May 27, 2009, Office Action, the Examiner did not provide a substantial answer and/or rebuttal to Appellant's August 25, 2009, arguments at pages 4-6 that Keyes *et al.* fails to teach each the first and second mathematical model aspects of independent claim 11. Again and as indicated above, the Examiner merely re-asserted the opinion that first and second mathematical models are disclosed in Keyes *et al.*, and "clarified" this assertion by pointing to the partial sample underwriting and inferred values of the remainder aspects of Keyes *et al.* <u>**However, while the Examiner appears to rely on the "partial sample underwriting" and "inferred values of the remainder" in Keyes *et al.* as corresponding to the claimed first and second models, the Examiner offers no explanation regarding how these features result in the same functionality as the claimed first and second mathematical models as recited in claim 11**</u>**.**

Finally, with respect to the statement that "whether a system has one complicated mathematical model or two or more mathematical models which are combined is completely subjective," Applicant disagrees. In claim 11, one model is constructed with one set of inputs and is used in one situation, and a second model is also constructed with a second set of inputs and is used in a second situation (*i.e.*, depending on what data is available). Both models produce the same output (*i.e.*, both "estimat[e] the probability of [an] adverse event" in claim 11) but do so in different situations and using different inputs. By contrast, in Keyes, it appears that

the Examiner is taking two different aspects of the same model and merely calling it two models. However, the two different "models" do not include one model which is used in one situation and another model which is used in another situation, depending on what loan data is available. Further, the two "models" do not produce the same output (*i.e.*, an "estimat[e] the probability of [an] adverse event") using different available loan data as recited in claim 11.[2]

II. Keyes *et al.* fails to disclose all the claim limitations and fails to anticipate the claims because Keyes *et al.* does not suggest the specific steps for creating the second mathematical model based on outputs of the first mathematical model as recited in the pending claims.

Claim 11 recites specific steps for constructing the second mathematical model. Specifically, claim 11 recites:

> [B] constructing a second mathematical model for use with loans for which at least some of the loan data for the set of explanatory variables is not available, including
>
> [i] estimating the probability of the adverse event for a first group of loans for which the loan data is available for the set of explanatory variables using the first mathematical model,
>
> [ii] iteratively estimating the probability of the adverse event for the first group of loans using the second mathematical model,
>
> [iii] selecting an optimal set of weighting coefficients for the second mathematical model, the optimal set of coefficients being selected so as to minimize errors in outputs generated by the

[2] Under 35 U.S.C. §102, a claim is anticipated, *i.e.*, rendered not novel, when a prior art reference discloses every limitation of the claim. *In re Schreiber*, 128 F.3rd 1473, 1477 (Fed. Cir. 1997). "Rejections under 35 U.S.C. § 102[] are proper only when the claimed subject matter is **identically** disclosed or described in the prior art." *In re Arkley, Eardley, and Long*, 172 U.S.P.Q. 524, 526 (CCPA 1972) (*Emphasis added.*) Recently, in *Net MoneyIn, Inc. v. VeriSign, Inc.*, the Federal Circuit held that the test for anticipation by a single reference under 35 U.S.C. § 102 requires that a single reference not only disclose all elements of the invention, **but that all the elements be arranged or combined in the same way as in the claim**. No. 2007-1565 ((Fed. Cir. 10/20/2008) (Fed. Cir., 2008)). (*Emphasis added.*)

second mathematical model for the first group of loans relative to outputs generated by the first mathematical model for the first group of loans, and

[iv] storing a set of error values, the set of error values relating to the errors in the outputs generated by the second mathematical when using the optimal set of coefficients relative to the outputs generated by the first mathematical model

Applicant respectfully submits that Keyes fails to teach or suggest these steps.

The Final Office Action of November 24, 2009, asserts that Column 1, lines 60-65, Column 2, lines 14-21, and Column 6, lines 11-65 of Keyes *et al.* allegedly contain each and every one of limitations [B][i]-[B][iv]. Appellant disagrees.

Column 6, lines 11-65 of Keyes *et al.* recites the following:

Organizing valuation scores is performed by collating, in electronic form, a cluster number, a cluster name, descriptive attributes of the cluster(s), probabilistic recovery values (an illustrative example is a HELTR score) and the underwriter's confidence in each cluster's valuation based upon the strengths of each cluster's descriptive attributes. The cluster number is a unique identifier of a specific set of descriptive attributes that are facts about an asset which a person skilled in evaluations uses to assess value of an asset. Examples of descriptive attributes include, but are not limited to, payment status, asset type, borrower's credit worthiness expressed as a score, location and seniority of a claim. The cluster name is, in one embodiment, an alpha-numeric name that describes the cluster's descriptive attributes or sources. One example of descriptive attributes is found in FIG. 12, described below.

Descriptive attributes are the facts or dimensions or vectors that were used to develop the asset's value. Computer logic is used to check for replicated clusters, if any, and alert the analysts or underwriters.

Because each asset can be described by many combinations of descriptive attributes, various levels of value for the same asset may occur. Probabilistic recovery values or credit score or any numerical indication of the asset's worth are indicators of worth

> designated at the discrete asset level. All of the information from the various descriptive attributes is synthesized such that a purchase or sale price can be ascertained as a fixed value or a probabilistic one. An illustrative embodiment used herein is the HELTR score. Each cluster has a unique set of descriptive attributes and designated HELTR score.
>
> Every cluster's unique attributes contribute to a valuation of cluster value. Different combinations of attributes provide a higher confidence or confidence interval of a particular cluster's score. For example, if any asset was described as a green piece of paper with height equal to 2.5" and width equal to 5"--one might ascribe a value of 0 to 1000 dollars and place very little confidence in this assessment. If this same asset was described with one more fact or attribute or vector as being a real $20 US bill, one would place a very high confidence factor on this cluster value of $20 US dollars.
>
> A cluster's valuation and confidence is determined at a point in time and recorded. Sometimes new information becomes available and the analyst would like to alter the value(s). The value is altered manually or automatically with a data field and decision rules, in the automated fashion via computer code. The prior values are manipulated to reflect new information. As an illustrative example, assume the prior cluster confidence was recorded at 0.1 and it is learned that a different asset with exact descriptive attributes as in this cluster just sold for over the predicted "most probable" value. Rules were in effect such that if this event occurred, cluster confidence is multiplied by 10. 0.1.x10=1 which is the revised cluster confidence.

Appellant submits that nowhere in the above-quoted section of Keyes *et al.* can any mention of the following features be found: iterative estimation of the probability of an adverse event; selection of "an optimal" set of weighting coefficients "to minimize errors in outputs generated by the second mathematical model;" or storing a set of error values, where the set of error values relates to the errors in the outputs generated by the second mathematical model when using the optimal set of coefficients relative to the outputs generated by the first

mathematical model. At best, Keyes *et al.* describes organizing valuation scores through the use of clusters that have certain descriptive attributes used to develop an asset's value, where confidence levels are assigned to clusters. As described at, *e.g.*, Column 6, lines 42-65, the confidence levels may be interpreted to be some type of "weighting," but certainly **not** "weighting coefficients for the second mathematical model, the optimal set of coefficients being selected so as to minimize errors in outputs generated by the second mathematical model for the first group of loans relative to outputs generated by the first mathematical model for the first group of loans." Moreover, Appellant submits that Keyes *et al.* is devoid of any description of "error values," let alone error values that are stored and indicative of errors as described in claim 11.

Therefore and in light of the above, Appellant submits that Keyes *et al.* fails to teach or suggest constructing a second mathematical model in the manner disclosed in independent claim 11, and therefore cannot anticipate claim 11. **That is, the Examiner has failed to explicitly describe how/where Keyes *et al.* suggests the following limitations required in independent claim 11: "estimating the probability of the adverse event for a first group of loans for which the loan data is available for the set of explanatory variables using the first mathematical model," "iteratively estimating the probability of the adverse event for the first group of loans using the second mathematical model," "selecting an optimal set of weighting coefficients for the second mathematical model, the optimal set of coefficients being selected so as to minimize errors in outputs generated by the second mathematical model for the first group of loans relative to outputs generated by the first**

mathematical model for the first group of loans," and "storing a set of error values, the set of error values relating to the errors in the outputs generated by the second mathematical when using the optimal set of coefficients relative to the outputs generated by the first mathematical model."

It appears from the language of the rejection set forth in the May 27, 2009, and the November 24, 2009, Office Actions, that the Examiner has asserted that some aspect of Keyes *et al.* reads on independent claim 11 because it inherently discloses some determination of a "proper price for a set of loans."

However, Appellant submits that Keyes *et al.* does not teach or suggest independent claim 11 because Keyes *et al.* does not suggest the specific steps for creating the second mathematical model based on the outputs of the first mathematical model as recited in independent claim 11. Appellant submits that a generalized recitation of, *e.g.*, underwriting/loan pricing, as set forth in Keyes *et al.* does not inherently suggest determining the probability of an adverse event, let alone the aforementioned steps of estimating the probability of that adverse event in any way. The Examiner has provided no basis in fact and/or technical reasoning to support the determination that steps [B][i]-[B][iv] are inherently performed in Keyes. *See* MPEP 2112. The specific steps set forth in claim 11 are simply not disclosed in Keyes nor are they inherent in Keyes.

Additionally, Appellant again submits that the Examiner failed to substantially answer or rebut Appellant's arguments presented at least in the August 25, 2009, Reply in violation of Section 707.07(f) of the MPEP. To wit, the Examiner's assertions regarding adverse

events/loan pricing and cluster valuation and confidence as allegedly being error measures that are stored, do not address each and every claim limitation at issue, and fail to completely rebut or answer the entirety of Applicant's arguments. That is, and again, Keyes *et al.* fails to teach or suggest "estimating the probability of the adverse event for a first group of loans for which the loan data is available for the set of explanatory variables using the first mathematical model," "iteratively estimating the probability of the adverse event for the first group of loans using the second mathematical model," "selecting an optimal set of weighting coefficients for the second mathematical model, the optimal set of coefficients being selected so as to minimize errors in outputs generated by the second mathematical model for the first group of loans relative to outputs generated by the first mathematical model for the first group of loans," and "storing a set of error values, the set of error values relating to the errors in the outputs generated by the second mathematical when using the optimal set of coefficients relative to the outputs generated by the first mathematical model." **<u>The Office Action does not specifically address each and every one of these limitations of claim 11.</u>**

III. Keyes *et al.* fails to disclose all the claim limitations and fails to anticipate the claims because Keyes *et al.* fails to disclose any "error values," let alone the use of error values in the manner set forth in the pending claims.

Claim 11 recites not only randomly drawing error values, but specifically "**estimating the probability of the adverse event for the second group of loans** includes randomly drawing error values from the set of error values and **adjusting the outputs of the second mathematical model for the second group of loans in accordance with the randomly**

drawn error values, the randomly drawn error values **causing a distribution of the probability values produced by the second mathematical model for the second group of loans to more closely match a distribution of the probability values produced by the first mathematical model for the first group of loans**." Hence, in claim 11, the error values are used to cause the distribution of the probability values produced by the second mathematical model for the second group of loans to more closely match a distribution of the probability values produced by the first mathematical model for the first group of loans. **The Examiner does not specifically address each and every one of these limitations of independent claim 11.**

In the Final Office Action of November 24, 2009, the Examiner asserted that Column 2, lines 14-21, and Column 6, lines 4-65 of Keyes *et al.* allegedly contain each and every one of these limitations. Appellant disagrees.

Column 2, lines 14-21, and Column 6, lines 11-65 have been discussed above. Column 6, lines 4-10 of Keyes *et al.* merely indicates that:

> One exemplary method first organizes valuation scores (static and/or probabilistic recoveries) in a computerized system. Adjustments are then made to the valuation scores for special factors and business decisions. Then a reconciliation of multiple valuation scores describing the same asset and an overall adjustment to interview/override the inferred valuation is performed.

As is clear, Keyes *et al.* merely describes, in a general sense, the organization of valuation scores and adjusting the scores to reconcile/adjust certain valuation scores. Nowhere in this section of Keyes *et al.* is the random drawing of error values suggested, let alone estimating the probability of an adverse event. Moreover, it is also clear from the above, that Keyes *et al.* is

directed to reconciling scores "for the same asset," not for matching a distribution of probability values produced by the second mathematical model for a second group of loans and that of a first group of loans. **In light of the above, Appellant submits that the Examiner has failed to describe with specificity, how the "clustering" and "valuation" as disclosed in Keyes *et al.* result in the same functionality as the claimed "estimating the probability of the adverse event for the second group of loans" which "includes randomly drawing error values from the set of error values and adjusting the outputs of the second mathematical model for the second group of loans in accordance with the randomly drawn error values, the randomly drawn error values causing a distribution of the probability values produced by the second mathematical model for the second group of loans to more closely match a distribution of the probability values produced by the first mathematical model for the first group of loans" as recited in claim 11.**

In the Final Office Action of November 24, 2009, the Examiner further asserted that "random drawing of error values is the clustering." (Appellant presumes that this assertion was made in light of the "randomly drawing error values" feature disclosed in the last limitation of independent claim 11.)

Appellant respectfully disagrees. First, Column 3, lines 48-67 of Keyes *et al.* describes "clustering" as some grouping of assets that may be further grouped into, *e.g.*, tranches, where the asset groups are sample underwritten, for example. Furthermore, Keyes *et al.* describes that such groupings maybe randomly sampled. However, Keyes *et al.* fails to make any suggestion that the act of clustering is in any way associated with error values, and cannot be

reasonably interpreted to read on the claimed random drawing of error values. Moreover, Appellant submits that contrary to the Examiner's assertions, the claimed random drawing of error values cannot be "the clustering," because the "clusters" are generated after the process of clustering, and the random selection of clusters occurs after "the clustering."

Second, Appellant submits that Section 707.07(f) of the MPEP has been violated because the Examiner, while attempting to address the claimed random drawing of error values, completely ignored the remaining features of independent claim 11.

IV. Keyes *et al.* fails to disclose all the limitations recited in and thus fails to anticipate independent claim 20 for at least the same reasons as presented herein with regard to independent claim 11.

Independent claim 20 recites "estimating a second set of weighting coefficients for a second mathematical model by performing a second regression operation, the second model being a function of only a subset of the predetermined loan parameters and the second set of weighting coefficients, the second set of weighting coefficients being associated with respective ones of the subset of the predetermined set of loan parameters, the second regression operation causing the second mathematical model to produce a probability distribution which is in overall alignment with a probability distribution produced by the first mathematical."

Appellant submits that for at least the same reasons described above with regard to independent claim 11, Keyes *et al.* fails to suggest estimating a second set of weighting coefficients for a second mathematical model by performing a second regression operation which causes the second mathematical model to produce a probability distribution which is in overall

alignment with a probability distribution produced by the first mathematical in the manner set forth in independent claim 20.

Likewise, independent claim 20 recites "determining the probability of the adverse event using the second mathematical model in connection with a second plurality of loans, including randomly drawing error values from the set of error values and adjusting the outputs of the second mathematical model for the second plurality of loans in accordance with the randomly drawn error values, the randomly drawn error values causing a distribution of the probability values produced by the second mathematical model for the second plurality of loans to more closely match a distribution of the probability values produced by the first mathematical model for the first group of loans." Again, and for at least the same reasons as previously discussed with regard to claim 11, Appellant submits that Keyes *et al.* fails to teach or suggest using error values in the manner set forth in claim 20. **Moreover and again, the Examiner fails to specifically address these limitations of independent claim 20.**

Discussion of Rejections under 35 U.S.C. § 103(a):

Requirements for a *prima facie* case of obviousness

In *In re Rijckaert*, 9 F.3d 1531, 1532, (Fed. Cir. 1993), the Federal Circuit outlined the burden on the PTO as follows with regard to rejections made under 35 U.S.C. § 103:

> In rejecting claims under 35 U.S.C. 103, the examiner bears the initial burden of presenting a *prima facie* case of obviousness. *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992). Only if that burden is met, does the burden of coming forward with evidence or argument shift to the applicant. *Id.* "A prima facie case of obviousness is established when the teachings

> from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art." *In re Bell* , 991 F.2d 781, 782, 26 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1993) (quoting *In re Rinehart*, 531 F.2d 1048, 1051, 189 U.S.P.Q. 143, 147 (CCPA 1976)). If the examiner fails to establish a *prima facie* case, the rejection is improper and will be overturned. *In re Fine*, 837 F.2d 1071, 1074, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988).

In order to make a *prima facie* case of obviousness, the Examiner must demonstrate that the prior art (i) teaches or suggests every claim limitation, (ii) provides a motivation to combine (or modify) the teachings of the selected references, and (iii) provides a reasonable expectation of success. *In re Vaeck*, 947 F.2d 488, 493, 20 USPQ2d 1438 (CAFC 1991); MPEP § 2143. This is the "TSM" test for obviousness which was recently affirmed by the Supreme Court. *KSR Int'l Co. v. Teleflex Inc.*, No. 04-1350, 550 U.S. 398 (2007), slip op. at 15 (2007). In explicating the correct standard for this test, the *KSR* Court reaffirmed previous holdings that an invention "is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *KSR*, slip op. at 14.; see also, *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457 (Fed. Cir. 1998). Furthermore, the Court warned the fact-finder to be aware of the distortion caused by hindsight bias and to be cautious of arguments reliant upon *ex post* reasoning. *KSR*, slip op. at 17.

V. Keyes *et al.* and Starkman fail to render as obvious, claims 12-15 and 21 because Starkman cannot cure each of the aforementioned deficiencies of Keyes *et al.*

Appellant submits that claims 12-15 and 21 depend, either directly or indirectly, from one of allowable independent claims 1 or 20, and are therefore patentable for at least that reason, as well as for additional patentable features when those claims are considered as a whole.

VI. Keyes *et al.* and admitted prior art fail to render as obvious, claim 23 because the admitted prior art cannot cure each of the aforementioned deficiencies of Keyes *et al.*

First, Appellant submits that claim 23 depends indirectly from allowable independent claim 20, and is therefore patentable for at least that reason, as well as for additional patentable features when that claim is considered as a whole.

Additionally, the Examiner asserted that it is allegedly old and well known to iteratively solve for a value (*e.g.*, a random number between 1 and 100) and, therefore, "it would have been obvious to... solve for the credit premium using that method." However, there is no explanation as to why a person of ordinary skill in the art would have been motivated to solve for credit premium, as opposed to, *e.g.*, solving for some random number between 1 and 100. As such, Appellant submits that the Examiner has failed to present a *prima facie* case of obviousness.

CLAIMS APPENDIX

1-10. (Canceled)

11. (Currently Rejected) Machine readable media having stored therein a set of instructions that when executed cause a computer to implement a process for determining a probability of an adverse event in connection with a plurality of loans, the plurality of loans having varying amounts of loan data available, the process comprising:

constructing a first mathematical model for use with loans for which loan data is available for a set of explanatory variables, the set of explanatory variables including variables

that relate to risk characteristics of the loan, risk characteristics of collateral for the loan, and risk characteristics of a borrower associated with the loan;

constructing a second mathematical model for use with loans for which at least some of the loan data for the set of explanatory variables is not available, including

estimating the probability of the adverse event for a first group of loans for which the loan data is available for the set of explanatory variables using the first mathematical model,

iteratively estimating the probability of the adverse event for the first group of loans using the second mathematical model,

selecting an optimal set of weighting coefficients for the second mathematical model, the optimal set of coefficients being selected so as to minimize errors in outputs generated by the second mathematical model for the first group of loans relative to outputs generated by the first mathematical model for the first group of loans, and

storing a set of error values, the set of error values relating to the errors in the outputs generated by the second mathematical when using the optimal set of coefficients relative to the outputs generated by the first mathematical model; and

estimating the probability of the adverse event for a second group of loans using the second mathematical model, wherein at least some loan data for the set of explanatory variables is not available for the second group of loans, and wherein estimating the probability of the adverse event for the second group of loans includes randomly drawing error values from the set of error values and adjusting the outputs of the second mathematical model for the second

group of loans in accordance with the randomly drawn error values, the randomly drawn error values causing a distribution of the probability values produced by the second mathematical model for the second group of loans to more closely match a distribution of the probability values produced by the first mathematical model for the first group of loans.

12. (Currently Rejected) The machine-readable media of claim 11, wherein the adverse event is delinquency.

13. (Currently Rejected) The machine-readable media of claim 11, wherein the adverse event is default.

14. (Currently Rejected) The machine-readable media of claim 11, wherein the adverse event is prepayment.

15. (Currently Rejected) The machine-readable media of claim 11, wherein storing the set of error values includes partitioning the error values into different partition groups, each respective error value being partitioned according to a length of time of delinquency of a corresponding one of the loans.

16. (Currently Rejected) The machine-readable media of claim 11, wherein the set of explanatory variables includes a credit premium, the credit premium reflecting a premium paid by a borrower in a note rate of the loan as compared to an average note rate of similar loans made to other borrowers.

17-19. (Canceled)

20. (Currently Rejected) Machine readable media having stored therein a set of instructions that when executed cause a computer to implement a process comprising:

estimating a first set of weighting coefficients for a first mathematical model by performing a first regression operation, the first mathematical model being a function of a predetermined set of loan parameters and the first set of weighting coefficients, the first set of weighting coefficients being associated with respective ones of the predetermined set of loan parameters, the first regression operation optimizing the first set of weighting coefficients based on performance history of a first plurality of loans, the first plurality of loans having loan data available for the predetermined set of loan parameters;

estimating a second set of weighting coefficients for a second mathematical model by performing a second regression operation, the second model being a function of only a subset of the predetermined loan parameters and the second set of weighting coefficients, the second set of weighting coefficients being associated with respective ones of the subset of the predetermined set of loan parameters, the second regression operation causing the second mathematical model to produce a probability distribution which is in overall alignment with a probability distribution produced by the first mathematical, the second mathematical model further being a function of a set of stored error values relating to errors in probabilities produced by the second mathematical model as compared to probabilities produced by the first mathematical model; and

determining the probability of the adverse event using the second mathematical model in connection with a second plurality of loans, including randomly drawing error values from the set of error values and adjusting the outputs of the second mathematical model for the second plurality of loans in accordance with the randomly drawn error values, the randomly

drawn error values causing a distribution of the probability values produced by the second mathematical model for the second plurality of loans to more closely match a distribution of the probability values produced by the first mathematical model for the first group of loans.

21. (Currently Rejected) The machine-readable media of claim 20, wherein the errors are partitioned into categories according to length of loan delinquency.

22. (Currently Rejected) The machine-readable media of claim 20, wherein the set of loan parameters includes a credit premium, the credit premium reflecting a premium paid by a borrower in a note rate of the loan as compared to an average note rate of similar loans made to other borrowers.

23. (Currently Rejected) The machine-readable media of claim 22, wherein the credit premium is determined by starting with an initial note rate, adjusting the initial rate up and/or down in accordance with variables associated with the mortgage loan to arrive at a predicted note rate, and comparing the predicted note rate with a note rate paid by the borrower to arrive at the credit premium.

24.-32. (Canceled)

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.

Respectfully submitted,

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